

structure in which it interferes, with the function as a spring seat, it can serve also as the function of a seal plate and the conventional fault will be canceled. Furthermore, although interference with a cage is avoided, since bearing width of face can be constituted narrowly, the large pitch (span) of the bearing allotted face to face can be taken, and moment rigidity can be raised.

[0020] "The second operation gestalt" (drawing 2)

Although this operation gestalt is an example of a bearing unit with the same configuration as the first operation gestalt and abbreviation mentioned above, they differ at the point which cut the upper limit (outer diameter) of the spring seat inside 17, and made bore side 18b the radial-locating step 18. Other operation configurations are the same as that of the first operation gestalt.

[0021] "The third operation gestalt" (drawing 3)

Although this operation gestalt is an example of a bearing unit with the same configuration as the first operation gestalt and abbreviation mentioned above, they differ at the point which cut the spring seat inside 17 and made outer-diameter side 18a and bore side 18b the radial-locating step 18. Other operation configurations are the same as that of the first operation gestalt.

[0022] "The fourth operation gestalt" (drawing 4)

This operation gestalt makes the end face of this flange 14 the shaft-orientations positioning thrust reliance section 15 while it extends the upper limit (outer diameter) of the spring seat 12 to shaft orientations and uses it as the fitting flange 14. Therefore, it is an example of the bearing unit which forms the cage interference recess 21 with request distance between the spring seat external surface 13 and cage tooth-back 11a by dashing the above-mentioned shaft-orientations positioning thrust reliance section 15 against seal-groove wall surface 4a of an outer ring of spiral wound gasket 3. In addition, if it was in the configuration of the radial-locating step 18 of a spring 20, the configuration was adopted like the second operation gestalt. Other operation configurations are the same as that of the first operation gestalt.

[0023] "The fifth operation gestalt" (drawing 5)

Although this operation gestalt is a bearing unit with the same configuration as the fourth operation gestalt mentioned above, it does not form the radial-locating step 18 of a spring 20 in the spring seat inside 17, but differ in that a spring 20 shall be directly received by the inside 17. Other operation configurations are the same as that of the first operation gestalt.

[0024]

[Effect of the Invention] According to this invention, since width of face is narrow and interference with a cage may occur in a cage tooth-back side, to the bearing which cannot equip with a seal plate (shielding), it is stabilized and can equip with the spring for precompression between two bearing pressed fit in the shaft. Moreover, since it can consider as a narrow bearing configuration according to this invention, having the above-mentioned operation effectiveness, the large pitch (span) of bearing can be taken and moment rigidity can be raised.

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the bearing unit used for small motors which dislike the deflection which synchronized with rotation of a shaft, such as a VTR (Video Tape Recorder: video tape recorder) drum spindle motor and a LBP (Laser Beam Printer: laser beam printer) spindle motor.

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PRIOR ART

[Description of the Prior Art] In the small motor which dislikes the deflection which synchronized with rotation of shafts, such as a VTR drum spindle motor and a LBP spindle motor, in order to suppress the deflection of a bearing unit, between a shaft and an inner ring of spiral wound gasket, adhesion clearance is not given, but two bearing is pressed fit, and there are some which are putting in the spring between these bearing.

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, since width of face is narrow and interference with a cage may occur in a cage tooth-back side, to the bearing which cannot equip with a seal plate (shielding), it is stabilized and can equip with the spring for precompression between two bearing pressed fit in the shaft. Moreover, since it can consider as a narrow bearing configuration according to this invention, having the above-mentioned operation effectiveness, the large pitch (span) of bearing can be taken and moment rigidity can be raised.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] In this kind of bearing unit, since there is a merit that moment rigidity is raised, it is desirable to take the large pitch (for it to also be called a span) of bearing. As a bearing configuration which obtains this merit, a narrow thing is desirable on the relation which enlarges the span of bearing. As this conventional kind of a bearing unit, the bearing unit shown in drawing 6 is mentioned as an example of representation, this unit opens spacing in the peripheral face of a revolving shaft 100 mutually, and fixes anti-friction bearing 200,200, the end faces 201a and 201a of the outer ring of spiral wound gasket 201,201 of bearing which face are equipped with the spring seat 300,300, coiled spring 400 is infixed in them through this spring seat 300,300, and precompression is given to them, for example. 500 are shielding currently fixed to the end faces 201a and 201a which face, and the end faces 201b and 201b of the opposite side among drawing, 600 shows a cage and the tooth back 601 of a cage 600 is located in a shielding 500 side. However, as for this conventional technique, broad type bearing is applied. That is, it was difficult to obtain the merit of a narrow bearing configuration not being applied but raising moment rigidity with such structure since it was difficult to surely narrow bearing width of face in order to avoid interference with shielding 500 and the tooth back 601 of a cage 600. In addition, although the type which eliminates the spring seat 300 and opens this inside can be considered, only by opening wide, a spring will enter in bearing, or it slides on an outer-ring-of-spiral-wound-gasket flat surface, and the fault of jumping out arises.

[0004] The place which this invention was made in view of such a trouble that the conventional technique has, and is made into the purpose is offering the bearing unit which has the seal plate combination spring seat which avoided the interference by the side of a cage tooth back, and aimed at improvement in moment rigidity.

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MEANS

[Means for Solving the Problem] It fixed centering on two bearing, and in the unit which prepared the spring and has given precompression between these bearing, the spring seat was attached in bearing, and serves as the seal plate, and the technical means which this invention made in order to attain the above-mentioned technical problem are having established the interference recess by the side of a cage tooth back inside this spring seat. [0006] The above-mentioned spring seat is good as what is prolonged in a radial inner-ring-of-spiral-wound-gasket side, and forms a labyrinth between the bore side of this spring seat, and an inner-ring-of-spiral-wound-gasket end face, a shaft or both sides.

[0007] Moreover, a spring seat may be formed with plastics and it is good also considering a spring as a disk spring.

[0008] Furthermore, the light pressure close and adhesion may be used together that a shaft and bearing insert each other in.

[0009]

[Embodiment of the Invention] Hereafter, 1 operation gestalt of this invention bearing unit is explained based on drawing. In addition, it does not pass in 1 operation gestalt of this invention bearing unit, a limited interpretation is not carried out at all at this, and a design change is possible for this operation gestalt within the limits of this invention.

[0010] Two bearing by which one is fixed to a shaft among drawing and 2 and 2 are being fixed to this shaft 1, and 20 show the bearing 2 of these two individuals, and the spring currently arranged among two.

[0011] Bearing 2 has two or more rolling elements 10 incorporated between an outer ring of spiral wound gasket 3, an inner ring of spiral wound gasket 6, and this outer ring of spiral wound gasket 3 and an inner ring of spiral wound gasket 6, and the cage 11 to which it shows this rolling element 10, and it arranges the seal plate 19 in the side which un-counters while it arranges the spring seat 12 which served as the seal plate in the side which this bearing 2 and bearing 2 counter. The cage 11 is inserted so that the tooth-back 11a side may be located in the side which counters with the spring seat 12. That is, bearing 2 shall be equipped with the spring seat 12 which is what equipped with and opened the seal plate wide in one side (side which it is the opposite side of two bearing 2 and 2, and the tooth-back 11a side of a cage 11 counters), and served as the seal plate to the disconnection side. In addition, there is especially nothing of 19 seal plate with which the two un-countering side of bearing 2 and 2 is equipped by which a limited interpretation is carried out in the structure, and a noncontact seal and well-known non-contact shielding, or a well-known contact seal is suitably chosen within the limits of this invention.

[0012] Moreover, bearing 2 usually gives the press fit interference corresponding to an axial load between inner-ring-of-spiral-wound-gasket 6 bore and shaft 1 outer diameter, and is pressed fit so that it may insert each other in and the section may not shift, even if a big load is applied to shaft orientations or the axial load by impacts, such as fall, is applied. However, it is also possible to insert each other in and for the section to become a clearance, to use adhesives for instead of [which does not give a small interference to extent out of which the deflection by eccentricity does not come], in order to support an axial load, and to carry out press fit / adhesion immobilization of bearing and the shaft by concomitant use of few press fit interferences and adhesives.

[0013] In addition, in this invention, it is not limited to an illustration gestalt, but it replaces with an illustration gestalt, and, of course, an outer ring of spiral wound gasket 3, an inner ring of spiral wound gasket 6, and especially the rolling element 10 can adopt other gestalten suitably within the limits of this invention.

[0014] It forms the fitting flange 14 prolonged in shaft orientations in a part of the external surface 13, and the spring seat 12 is constituted, fits this flange 14 into an outer ring of spiral wound gasket 3, and the bearing 1 side (side which it is a disconnection side without the seal plate 19 of bearing, and cage tooth-back 11a counters) is equipped with it while it is formed in the shape of [of a major diameter] a circular ring rather than outer-ring-of-spiral-wound-gasket 3 bore at least. And this spring seat 12 serves as the seal plate by the side of cage tooth-back opposite (shielding), making an inside 17 a spring bearing side. Especially the quality of the material of the

spring seat 12 is not limited, but although a design change is possible suitably within the limits of this inventions, such as a metal, synthetic resin, and rubber, if it shall consist of synthetic-resin material, it can attain low cost-ization.

[0015] The shaft-orientations positioning thrust reliance section 15 is formed in that external surface (bearing opposed face) 13, and when [this] it dashes, the section 15 is dashed against the request part (dashing field) of an outer ring of spiral wound gasket 3 and fitting immobilization of the spring seat 12 is carried out, the cage interference recess [****] 21 is formed in the above-mentioned spring seat 12 between this spring seat external surface 13 and the cage tooth-back 11a side. The external surface 13 of this spring seat 12 is the recess tooth space formed so that it may not interfere the cage tooth-back 11a side, and the cage interference recess 21 consists of request tooth spaces formed between the spring seat external surface 13 and the cage tooth-back 11a side, when the spring seat 12 is fixed to an outer ring of spiral wound gasket 3. For example, upper spring seat external surface 13a of ** fitting flange 14 is made into the shaft-orientations positioning thrust reliance section 15. When this thrust reliance section 15 shall be dashed against the outer-ring-of-spiral-wound-gasket flat surface (dashing field) 5, The cage interference recess 21 which brought near spring seat external surface 13b of fitting flange 14 lower part in the inside 17 direction rather than spring seat external surface 13a of the fitting flange 14 upper part, and had request distance between cage tooth-back 11a is formed (drawing 1 , 2, 3 reference).

** Make the shaft-orientations apical surface of the fitting flange 14 into the shaft-orientations positioning thrust reliance section 15. When this thrust reliance section 15 shall be dashed against wall surface 4a in the seal groove 4 of an outer ring of spiral wound gasket 3, Spring seat external surface 13b of fitting flange 14 lower part is dashed, it brings near in the inside 17 direction rather than the section 15, and the cage interference recess 21 which had request distance between spring seat external surface 13b of fitting flange 14 lower part and cage tooth-back 11a is formed (drawing 4 , 5 reference). In addition, when the shaft-orientations positioning thrust reliance section 15 is dashed against the request part of an outer ring of spiral wound gasket 3 and fitting immobilization of the spring seat 12 is carried out at an outer ring of spiral wound gasket 3, especially if outside 13 location of cage tooth-back 11a and the spring seat 12 which counters is the configuration of estranging with the request distance of cage tooth-back 11a and extent in which it does not interfere, the limited interpretation of the cage interference recess 21 will not be carried out. Moreover, although the external surface 13 of the spring seat 12 which forms the cage interference recess 21 between cage tooth-back 11a is made into the shape of a straight in the direction of a path with this operation gestalt For example, you may be what prepares the circumferential groove (not shown) which carried out the concave bend, and forms the tooth space as cage interference recess in a shaft-orientations inside side in cage tooth-back 11a and the location which counters. Moreover, it is possible to adopt other configurations and to form the tooth space as cage interference recess in the bottom of the same main point. Moreover, when the external surface 13 of the spring seat 12 dashes the above-mentioned shaft-orientations positioning thrust reliance section 15 against the request part of an outer ring of spiral wound gasket 3, it is considered as the configuration which does not contact an inner ring of spiral wound gasket 6. The fitting flange 14 follows a circumferencial direction, is prepared in the request part of external surface 13, or it can be prepared intermittently.

[0016] It is also within the limits of this invention for the spring seat 12 to extend that bore to a radial inner-ring-of-spiral-wound-gasket side, to form the labyrinth 8 of very narrow clearance between the external surface 13 of this spring seat bore approach and the inner-ring-of-spiral-wound-gasket flat surface 7, and to raise protection-against-dust nature. Moreover, it is also within the limits of this invention to extend that bore side to a radial inner-ring-of-spiral-wound-gasket side further, to form the labyrinth 9 of very narrow clearance between this spring seat bore edge 16 and axial outer-diameter 1a, and to raise the further protection-against-dust nature. Especially the labyrinth 8 formed between the external surface 13 of the above-mentioned spring seat bore approach and the inner-ring-of-spiral-wound-gasket flat surface 7, for example although not illustrated is possible also for considering as a complicated and narrow labyrinth path by forming either or the both sides of the external surface 13 of spring seat bore approach, and the inner-ring-of-spiral-wound-gasket flat surface 7 in cross-sectional-view concave convex (or wavelike), and is within the limits of this invention. Moreover, even if it is in the labyrinth 9 formed between the spring seat bore edge 16 and axial outer-diameter 1a similarly, it is also possible to consider as a complicated and narrow labyrinth path by forming either or the both sides of the spring seat bore edge 16 and axial outer-diameter 1a in cross-sectional-view concave convex (or wavelike).

[0017] The spring seat 12 is good for the direction of a path as with the shape of a straight in the inside (confrontation of the spring seat 12 and 12 comrades) 17 which a spring 20 touches, and it is also possible to consider as the configuration which forms the radial-locating step 18 of a spring 20 in the request part of this inside 17, and corrects the posture of a spring 20 and a location. Although especially a limited interpretation is not carried out, the radial-locating step 18 of a spring 20 For example, the type which extended the upper limit

(outer diameter) of the spring seat inside 17 to shaft orientations, and made outer-diameter side 18a the positioning step 18 like ** drawing 1 , ** Like drawing 2 , the type which cut the arbitration part of the spring seat inside 17, and made outer-diameter side 18a and bore side 18b the positioning step 18 is mentioned as an example like the type which cut the upper limit (outer diameter) of the spring seat inside 17, and made bore side 18b the positioning step 18, and ** drawing 3 .

[0018] Although especially the spring 20 is not limited but uses the coil spring (a part is omitted on a drawing) with this operation gestalt, when between bearing 2 and 2 becomes narrow, it is replaced with this coil spring and is good also as a disk spring.

[0019] "The first operation gestalt" (drawing 1)

This operation gestalt carries out press fit immobilization of the two bearing 2 and 2 at outer-diameter 1a of a shaft 1, and this bearing 2 and 2 shows an example of the bearing unit which was equipped with the spring seats 12 and 12 which served as the seal plate, formed the coil spring 20 over this each of spring seat 12 and 12, and has given precompression to each side which faces. The spring seat 12 dashes the shaft-orientations positioning thrust reliance section 15 against the outer-ring-of-spiral-wound-gasket flat surface 5, and forms the tooth space which serves as the cage interference recess 21 between external surface 13 and cage tooth-back 11a while it fits into an outer ring of spiral wound gasket 3 the fitting flange 14 attached around the outer-diameter approach of external surface 13. Moreover, with this operation gestalt, while forming the very narrow labyrinth 8 between the external surface 13 of the bore approach of the spring seat 12, and the inner-ring-of-spiral-wound-gasket flat surface 7, the very narrow labyrinth 9 is formed between the bore edge 16 of this spring seat 12, and axial outer-diameter 1a. Moreover, the spring seat 12 extends inside upper limit (outer diameter) to shaft orientations, and is taken as the radial-locating step 18 of a spring 20. Therefore, the bearing 2 pressed fit in the shaft 1 and the spring 20 arranged among two are stabilized, is held by the spring seats 12 and 12, and it invades into bearing like before, or it does not have a possibility of jumping out to the method of outside, either. Moreover, since this spring seat 12 establishes the cage interference recess 21 which avoids interference with cage tooth-back 11a between cage tooth-back 11a and is arranged, If between two bearing 2 and 2 is narrow, it replaces with a seal plate and this spring seat 12 is allotted even if it is the case where seal plates are a cage and the structure in which it interferes, with the function as a spring seat, it can serve also as the function of a seal plate and the conventional fault will be canceled. Furthermore, although interference with a cage is avoided, since bearing width of face can be constituted narrowly, the large pitch (span) of the bearing allotted face to face can be taken, and moment rigidity can be raised.

[0020] "The second operation gestalt" (drawing 2)

Although this operation gestalt is an example of a bearing unit with the same configuration as the first operation gestalt and abbreviation mentioned above, they differ at the point which cut the upper limit (outer diameter) of the spring seat inside 17, and made bore side 18b the radial-locating step 18. Other operation configurations are the same as that of the first operation gestalt.

[0021] "The third operation gestalt" (drawing 3)

Although this operation gestalt is an example of a bearing unit with the same configuration as the first operation gestalt and abbreviation mentioned above, they differ at the point which cut the spring seat inside 17 and made outer-diameter side 18a and bore side 18b the radial-locating step 18. Other operation configurations are the same as that of the first operation gestalt.

[0022] "The fourth operation gestalt" (drawing 4)

This operation gestalt makes the end face of this flange 14 the shaft-orientations positioning thrust reliance section 15 while it extends the upper limit (outer diameter) of the spring seat 12 to shaft orientations and uses it as the fitting flange 14. Therefore, it is an example of the bearing unit which forms the cage interference recess 21 with request distance between the spring seat external surface 13 and cage tooth-back 11a by dashing the above-mentioned shaft-orientations positioning thrust reliance section 15 against seal-groove wall surface 4a of an outer ring of spiral wound gasket 3. In addition, if it was in the configuration of the radial-locating step 18 of a spring 20, the configuration was adopted like the second operation gestalt. Other operation configurations are the same as that of the first operation gestalt.

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Although this operation gestalt is a bearing unit with the same configuration as the fourth operation gestalt mentioned above, it does not form the radial-locating step 18 of a spring 20 in the spring seat inside 17, but differ in that a spring 20 shall be directly received by the inside 17. Other operation configurations are the same as that of the first operation gestalt.

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DESCRIPTION OF DRAWINGS**[Brief Description of the Drawings]**

[Drawing 1] The outline sectional view omitting and showing a part of first operation gestalt of this invention bearing unit.

[Drawing 2] The outline sectional view omitting and showing a part of second operation gestalt.

[Drawing 3] The outline sectional view omitting and showing a part of third operation gestalt.

[Drawing 4] The outline sectional view omitting and showing a part of fourth operation gestalt.

[Drawing 5] The outline sectional view omitting and showing a part of fifth operation gestalt.

[Drawing 6] Drawing of longitudinal section of the conventional technique.

[Description of Notations]

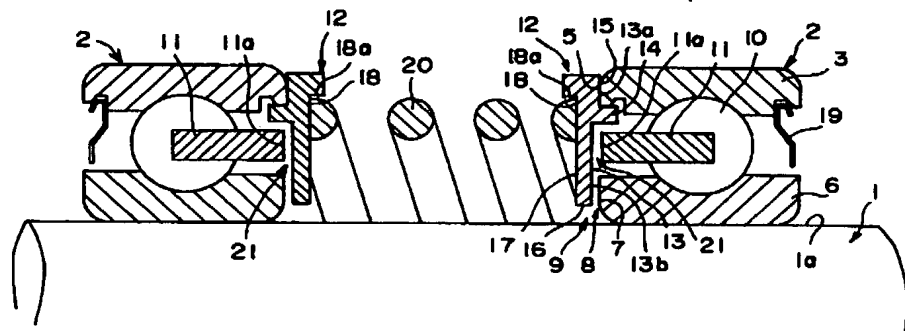
- 1: Shaft
- 2: Bearing
- 3: Outer ring of spiral wound gasket
- 6: Inner ring of spiral wound gasket
- 8 9: Labyrinth
- 10: Rolling element
- 11: Cage
- 11a: Cage tooth back
- 12: Spring seat
- 14: Fitting flange
- 15: Shaft-orientations positioning thrust reliance section
- 18: Radial-locating section
- 20: Spring
- 21: Cage interference recess

[Translation done.]

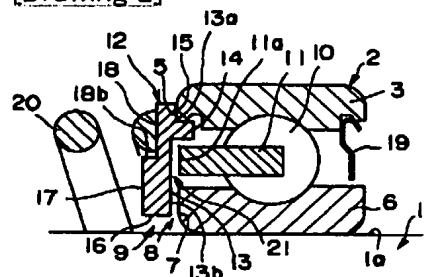
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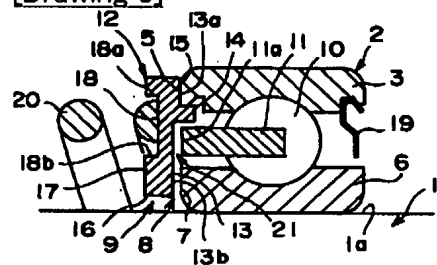
[Drawing 1]



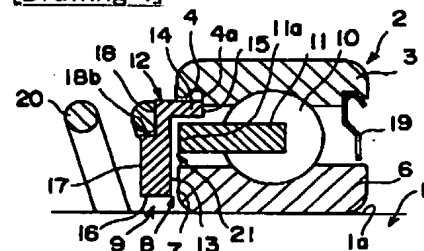
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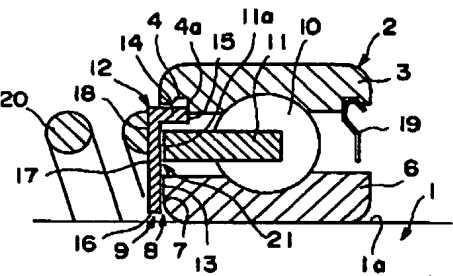
[Drawing 3]



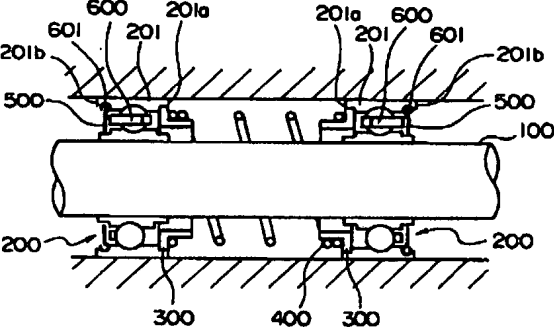
[Drawing 4]



[Drawing 5]



[Drawing 6]



[Translation done.]

(19) 日本国特許庁 (J P)

(12) 公開特許公報 (A)

(11) 特許出願公開番号

特開2002-323040

(P2002-323040A)

(43) 公開日 平成14年11月8日 (2002.11.8)

(51) Int.Cl. ⁷	識別記号	F I	テーマコード [*] (参考)	
F 1 6 C	25/06	F 1 6 C	25/06	3 J 0 1 2
	33/80		33/80	3 J 0 1 6
	35/063		35/063	3 J 0 1 7

審査請求 未請求 請求項の数 5 O L (全 5 頁)

(21) 出願番号 特願2001-128134(P2001-128134)

(22) 出願日 平成13年4月25日 (2001.4.25)

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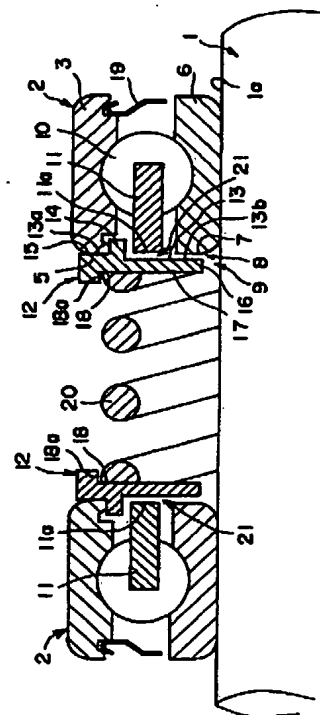
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(54) 【発明の名称】 軸受ユニット

(57) 【要約】

【課題】 保持器背面側との干渉を避けた密封板兼用ばね座を有し、モーメント剛性の向上を図った軸受ユニットを提供することである。

【解決手段】 軸1に二個の軸受2、2を圧入し、該軸受2、2の相対する側に夫々予圧ばね20を受けるばね座12、12を嵌合固定し、該ばね座12の外周面13には、保持器背面11aとの間に保持器干渉逃げ21となるスペースが形成され、かつ該ばね座12の外周面13と内輪平面7との間、およびばね座内径端16と軸外径1aとの間には、ラビリンス8、9が夫々形成され、密封板としての機能も奏している。



【特許請求の範囲】

【請求項 1】二個の軸受を軸に固定し、該軸受間にばねを設けて予圧を与えているユニットにおいて、ばね座が軸受に取付けられて密封板を兼ねており、該ばね座の内側に保持器背面側との干渉逃げを設けたことを特徴とする軸受ユニット。

【請求項 2】ばね座が半径方向内輪側に延び、該ばね座の内径面と、内輪端面と軸のいずれか一方若しくは双方との間にラビリンスを形成していることを特徴とする請求項 1 に記載の軸受ユニット。

【請求項 3】ばね座がプラスチックで形成されていることを特徴とする請求項 1 若しくは請求項 2 のいずれかに記載の軸受ユニット。

【請求項 4】ばねが皿ばねとしたことを特徴とする請求項 1、請求項 2 若しくは請求項 3 のいずれかに記載の軸受ユニット。

【請求項 5】軸と軸受の嵌め合いが軽圧入と接着を併用したことを特徴とする請求項 1、請求項 2、請求項 3 若しくは請求項 4 のいずれかに記載の軸受ユニット。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、VTR (Video Tape Recorder: ビデオテープレコーダ) ドラムスピンドルモータ、LBP (Laser Beam Printer: レーザービームプリンタ) スピンドルモータなど、軸の回転と同期した振れを嫌う小型モータに用いられる軸受ユニットに関する。

【0002】

【従来の技術】VTR ドラムスピンドルモータ、LBP スピンドルモータなど軸の回転と同期した振れを嫌う小型モータにおいて、軸受ユニットの振れを抑えるためには軸と内輪の間に接着すきまを持たせず二つの軸受を圧入し、該軸受間にばねを入れているものがある。

【0003】

【発明が解決しようとする課題】この種の軸受ユニットにおいて、軸受同士の間隔距離（スパンともいう）を大きく取るとは、モーメント剛性が上げられるというメリットがあるため好ましい。このメリットを得る軸受構成としては、軸受同士のスパンを大きくする関係上、幅狭なものが好ましい。従来のこの種の軸受ユニットとしては、例えば、図 6 に示す軸受ユニットが代表例として挙げられ、該ユニットは、回転軸 100 の外周面に互いに間隔をあけて転がり軸受 200、200 を固定し、相対する軸受の外輪 201、201 の端面 201a、201a には、ばね座 300、300 が備えられ、該ばね座 300、300 を介してコイルばね 400 が介装されて予圧が付与されている。図中、500 は相対する端面 201a、201a と反対側の端面 201b、201b に固定されているシールドで、600 は保持器を示し、保持器 600 の背面 601 は、シールド 500 側に位置

している。しかし、この従来技術は、幅広タイプの軸受が適用されるものである。すなわち、このような構造では、シールド 500 と保持器 600 の背面 601 との干渉を避けるため、どうしても軸受幅を狭くすることが困難であったため、幅狭の軸受構成は適用されず、モーメント剛性を上げるというメリットを得るのは困難であった。なお、ばね座 300 を排除してこの内側を開放するタイプが考えられるが、単に開放しておくだけでは、ばねが軸受内に入ってしまうか、若しくは外輪平面を滑って外に飛び出してしまうなどの不具合が生じる。

【0004】本発明は、従来技術の有するこのような問題点を鑑みなされたもので、その目的とするところは、保持器背面側との干渉を避けた密封板兼用ばね座を有し、モーメント剛性の向上を図った軸受ユニットを提供することである。

【0005】

【課題を解決するための手段】上記課題を達成するために本発明がなした技術的手段は、二個の軸受を軸に固定し、該軸受間にばねを設けて予圧を与えているユニットにおいて、ばね座が軸受に取付けられて密封板を兼ねており、該ばね座の内側に保持器背面側との干渉逃げを設けたことである。

【0006】上記ばね座は、半径方向内輪側に延び、該ばね座の内径面と、内輪端面と軸のいずれか一方若しくは双方との間にラビリンスを形成するものとしてよい。

【0007】また、ばね座をプラスチックで形成してもよく、また、ばねを皿ばねとしてもよい。

【0008】さらに、軸と軸受の嵌め合いは、軽圧入と接着を併用してもよい。

【0009】

【発明の実施の形態】以下、本発明軸受ユニットの一実施形態を図に基づいて説明する。なお、本実施形態は、本発明軸受ユニットの一実施形態にすぎず、何等これに限定解釈されるものではなく、本発明の範囲内で設計変更可能である。

【0010】図中、1 は軸、2 及び 2 は該軸 1 に固定されている二個の軸受、20 は該二個の軸受 2、2 間に配設されているばねを示す。

【0011】軸受 2 は、外輪 3 と、内輪 6 と、該外輪 3 と内輪 6 との間に組み込まれる複数の転動体 10 と、該転動体 10 を案内する保持器 11 とを有し、該軸受 2 と軸受 2 の対向する側には、密封板を兼ねたばね座 12 を配設すると共に、非対向する側には密封板 19 を配設する。保持器 11 は、ばね座 12 と対向する側に背面 11a 側が位置するように挿入されている。すなわち、軸受 2 は、片側（二個の軸受 2、2 の対向側で、保持器 11 の背面 11a 側が対向する側）に密封板を備えず開放したもので、その開放側に密封板を兼ねたばね座 12 を備えるものとした。なお、二個の軸受 2、2 の非対向側に備えられる密封板 19 は、特にその構造に限定解釈さ

れるものではなく、本発明の範囲内で周知の非接触シールド・非接触シールド若しくは接触シールドが適宜選択されるものである。

【0012】また軸受2は、軸方向に大きな荷重が掛かったり、落下などの衝撃による軸方向荷重が掛かって、嵌め合い部がずれないように、通常、軸方向荷重に見合った圧入締め代を内輪6内径と軸1外径の間に与えて圧入されている。しかし、嵌め合い部が隙間になり偏芯による振れが出ない程度に僅かにしか締め代を持たせない代わりに、軸方向荷重を支えるために接着剤を使用

して、僅かな圧入締め代と接着剤の併用で軸受と軸を圧入・接着固定することも可能である。

【0013】なお、本発明において外輪3、内輪6、転動体10は、特に図示形態に限定されず、図示形態に代えて本発明の範囲内で他の形態を適宜採用することは勿論可能である。

【0014】ばね座12は、少なくとも外輪3内径よりも大径の円環状に形成されると共に、その外面13の一部に軸方向に延びた嵌合鏝部14を設けて構成され、該鏝部14を外輪3に嵌合して軸受一侧（軸受の密封板1

9のない開放側で、保持器背面11aの対向する側）に備えられている。そして、このばね座12が、内面17をばね受面としつつ保持器背面对向側の密封板（シールド）を兼ねている。ばね座12の材質は、特に限定されず、金属・合成樹脂・ゴムなど本発明の範囲内で適宜設計変更可能であるが、合成樹脂材からなるものとする

と低コスト化が図れる。

【0015】上記ばね座12には、その外面（軸受対向面）13に軸方向位置決め突き当て部15が設けられ、この突き当て部15を外輪3の所望箇所（突き当て面）に突き当ててばね座12を嵌合固定した際に、該ばね座外面13と保持器背面11a側との間に所望な保持器干渉逃げ21が形成される。保持器干渉逃げ21は、ばね座12が外輪3に固定された際に、該ばね座12の外面13が、保持器背面11a側と干渉しないように形成される逃げスペースで、ばね座外面13と保持器背面11a側との間に形成される所望スペースにて構成される。

例えば、

①嵌合鏝部14の上方のばね座外面13aを軸方向位置決め突き当て部15とし、該突き当て部15を外輪平面（突き当て面）5に突き当てるものとした場合、嵌合鏝部14下方のばね座外面13bを、嵌合鏝部14上方のばね座外面13aよりも内面17方向に寄せて保持器背面11aとの間に所望距離をもった保持器干渉逃げ21を形成する（図1、2、3参照）。

②嵌合鏝部14の軸方向先端面を軸方向位置決め突き当て部15とし、該突き当て部15を外輪3のシールド4における壁面4aに突き当てるものとした場合、嵌合鏝部14下方のばね座外面13bを、突き当て部15よりも内面17方向に寄せて、嵌合鏝部14下方のばね座外

面13bと保持器背面11aとの間に所望距離をもった保持器干渉逃げ21を形成する（図4、5参照）。なお、保持器干渉逃げ21は、軸方向位置決め突き当て部15を外輪3の所望箇所に突き当ててばね座12を外輪3に嵌合固定した際に、保持器背面11aと対向するばね座12の外面13位置が、保持器背面11aと干渉しない程度の所望距離をもって離間する構成であれば特に限定解釈されるものではない。また、本実施形態では、保持器背面11aとの間で保持器干渉逃げ21を形成しているばね座12の外面13を径方向にストレート状としているが、例えば、保持器背面11aと対向する位置に、軸方向内面側に凹曲させた周溝（図示せず）を設けて保持器干渉逃げとしてのスペースを形成するものであってもよく、また同様の主旨の下に他の構成を採用して保持器干渉逃げとしてのスペースを形成するものとする

ことが可能である。また、ばね座12の外面13は、上記軸方向位置決め突き当て部15を外輪3の所望箇所に突き当てた際に、内輪6と接触しない構成とする。嵌合鏝部14は、外面13の所望箇所に円周方向に連続して設けるか、若しくは断続して設けることができる。

【0016】ばね座12は、半径方向内輪側にその内径を延ばし、このばね座内径寄りの外面13と内輪平面7との間に極狭いすきまのラビリンス8を形成して、防塵性を向上させることも本発明の範囲内である。また、その内径側をさらに半径方向内輪側に延ばし、このばね座内径端16と軸外径1aとの間に極狭いすきまのラビリンス9を形成して、さらなる防塵性を向上させることも本発明の範囲内である。特に図示しないが、例えば、上記ばね座内径寄りの外面13と内輪平面7との間に形成されるラビリンス8は、ばね座内径寄りの外面13と内輪平面7のいずれか一方若しくは双方を、断面視凹凸状（若しくは波状）に形成することで複雑かつ狭いラビリンス経路とすることも可能で、本発明の範囲内である。また同様に、ばね座内径端16と軸外径1aとの間で形成されるラビリンス9にあっても、ばね座内径端16と軸外径1aのいずれか一方若しくは双方を、断面視凹凸状（若しくは波状）に形成することで複雑かつ狭いラビリンス経路とすることも可能である。

【0017】ばね座12は、ばね20が接する内面（ばね座12、12同士の対面）17を径方向にストレート状のままとしても良いが、該内面17の所望箇所にばね20の半径方向位置決め段部18を設けてばね20の姿勢、位置を正す構成とすることも可能である。ばね20の半径方向位置決め段部18は、特に限定解釈はされないが、例えば、

①図1の如く、ばね座内面17の上端（外径）を軸方向に延ばして外径側18aを位置決め段部18としたタイプ、

②図2の如く、ばね座内面17の上端（外径）を凹設して内径側18bを位置決め段部18としたタイプ、

③図3の如く、ばね座内面17の任意箇所を凹設して外径側18aと内径側18bを位置決め段部18としたタイプなどが一例として挙げられる。

【0018】ばね20は特に限定されず、本実施形態では、コイルバネ（図面上では一部省略）を用いているが、軸受2、2間が狭くなると、このコイルバネに代えて皿ばねとしてもよい。

【0019】「第一実施形態」（図1）

本実施形態は、軸1の外径1aに二個の軸受2、2を圧入固定し、該軸受2、2は、夫々の相対する側に密封板を兼ねたばね座12、12を備え、該夫々のばね座12、12間にわたってコイルバネ20を設けて予圧を与えている軸受ユニットの一例を示す。ばね座12は、外面13の外径寄りに周設した嵌合鏝部14を外輪3に嵌合すると共に、軸方向位置決め突き当て部15を外輪平面5に突き当てて、外面13と保持器背面11aとの間に、保持器干涉逃げ21となるスペースを形成している。また、本実施形態では、ばね座12の内径寄りの外面13と内輪平面7との間に極狭いラビリンス8を形成すると共に、該ばね座12の内径端16と軸外径1aとの間に極狭いラビリンス9を形成している。また、ばね座12は、内面上端（外径）を軸方向に延ばしてばね20の半径方向位置決め段部18としている。従って、軸1に圧入された軸受2、2間に配されるばね20は、ばね座12、12によって安定して保持され、従来のように軸受内へ侵入したり、外方へ飛び出してしまう虞もない。また、該ばね座12は、保持器背面11aとの干渉を避ける保持器干涉逃げ21を保持器背面11aとの間に設けて配設されるため、二個の軸受2、2間が狭く密封板が保持器と干渉してしまう構造の場合であっても、密封板に代えてこのばね座12を配すれば、ばね座としての機能と共に、密封板の機能をも兼ねることができ、従来の不具合が解消される。さらに、保持器との干渉を避けつつも軸受幅を狭く構成することができるため、相対して配される軸受同士の中心間距離（スパン）を大きく取ることができ、モーメント剛性を上げることができる。

【0020】「第二実施形態」（図2）

本実施形態は、上述した第一実施形態と略同様の構成を有した軸受ユニットの一例であるが、ばね座内面17の上端（外径）を凹設して内径側18bを半径方向位置決め段部18とした点で異なる。その他の作用構成は第一実施形態と同様である。

【0021】「第三実施形態」（図3）

本実施形態は、上述した第一実施形態と略同様の構成を有した軸受ユニットの一例であるが、ばね座内面17を凹設して外径側18aと内径側18bを半径方向位置決め段部18とした点で異なる。その他の作用構成は第一実施形態と同様である。

【0022】「第四実施形態」（図4）

本実施形態は、ばね座12の上端（外径）を軸方向に延ばして嵌合鏝部14とすると共に、該鏝部14の端面を軸方向位置決め突き当て部15としているものである。従って、上記軸方向位置決め突き当て部15を外輪3のシール溝壁面4aに突き当てることで、ばね座外面13と保持器背面11aとの間に所望距離をもった保持器干涉逃げ21を形成する軸受ユニットの一例である。なお、ばね20の半径方向位置決め段部18の構成にあつては、第二実施形態と同様構成を採用した。その他の作用構成は第一実施形態と同様である。

【0023】「第五実施形態」（図5）

本実施形態は、上述した第四実施形態と同様の構成を有した軸受ユニットであるが、ばね座内面17に、ばね20の半径方向位置決め段部18を設けず、ばね20を内面17で直接受けるものとした点で異なる。その他の作用構成は第一実施形態と同様である。

【0024】

【発明の効果】本発明によれば、幅が狭く保持器背面側で保持器との干渉が発生しうるため密封板（シールド）が装着できない軸受に対し、軸に圧入された二個の軸受間の予圧用ばねを安定して装着できる。また、本発明によれば、上述の作用効果を有しながら、幅狭の軸受構成とし得るため、軸受同士の中心間距離（スパン）を大きくとることができ、モーメント剛性を上げることができる。

【図面の簡単な説明】

【図1】本発明軸受ユニットの第一実施形態を一部省略して示す概略断面図。

【図2】第二実施形態を一部省略して示す概略断面図。

【図3】第三実施形態を一部省略して示す概略断面図。

【図4】第四実施形態を一部省略して示す概略断面図。

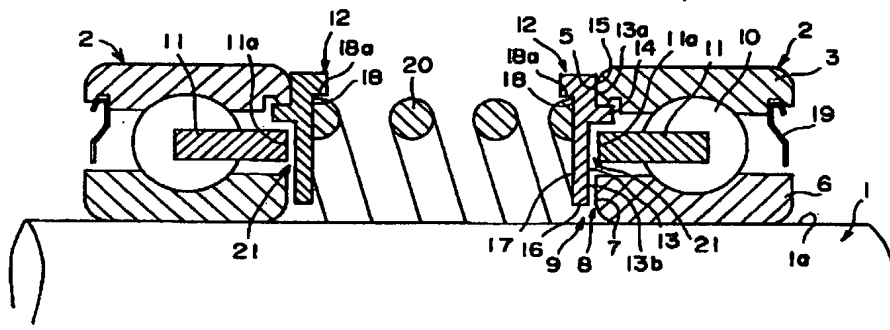
【図5】第五実施形態を一部省略して示す概略断面図。

【図6】従来技術の縦断面図。

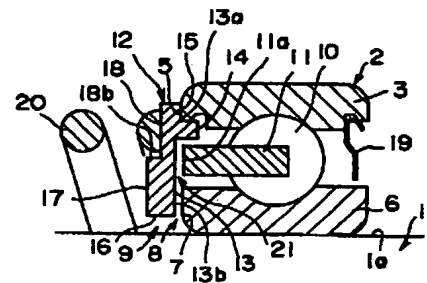
【符号の説明】

- 1：軸
- 2：軸受
- 3：外輪
- 6：内輪
- 8、9：ラビリンス
- 10：転動体
- 11：保持器
- 11a：保持器背面
- 12：ばね座
- 14：嵌合鏝部
- 15：軸方向位置決め突き当て部
- 18：半径方向位置決め部
- 20：ばね
- 21：保持器干涉逃げ

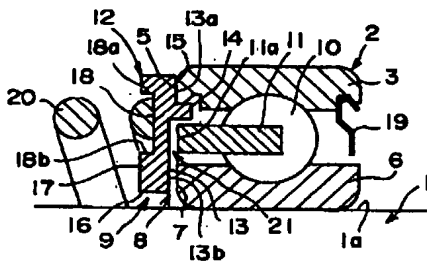
【図1】



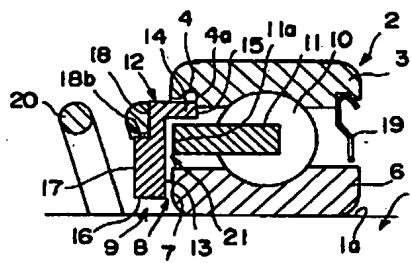
【図2】



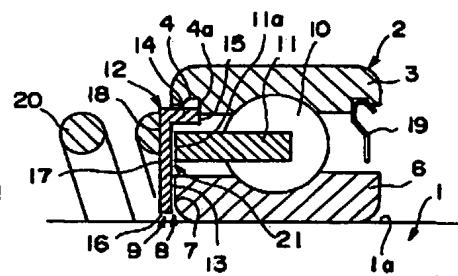
【図3】



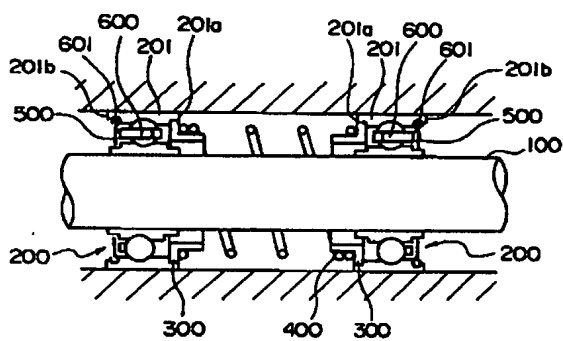
【図4】



【図5】



【図6】



フロントページの続き

Fターム(参考) 3J012 AB04 AB13 CB04 FB10 HB02
 3J016 AA01 BB17
 3J017 AA02 DA01 DB07 DB09

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CLAIMS

[Claim(s)]

[Claim 1] The bearing unit characterized by having fixed centering on two bearing, having attached the spring seat in bearing, serving as the seal plate in the unit which prepared the spring and has given precompression between these bearing, and establishing the interference recess by the side of a cage tooth back inside this spring seat.

[Claim 2] The bearing unit according to claim 1 characterized by prolonging a spring seat in a radial inner-ring-of-spiral-wound-gasket side, and forming the labyrinth between the bore side of this spring seat, and an inner-ring-of-spiral-wound-gasket end face, a shaft or both sides.

[Claim 3] A bearing unit given in either claim 1 characterized by forming the spring seat with plastics, or claim 2.

[Claim 4] A bearing unit given in either claim 1 characterized by a spring considering as a disk spring, claim 2 or claim 3.

[Claim 5] A bearing unit given in either claim 1 characterized by for a shaft and bearing having inserted in and **** using the light pressure close and adhesion together, claim 2, claim 3 or claim 4.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the bearing unit used for small motors which dislike the deflection which synchronized with rotation of a shaft, such as a VTR (Video Tape Recorder: video tape recorder) drum spindle motor and a LBP (Laser Beam Printer: laser beam printer) spindle motor.

[0002]

[Description of the Prior Art] In the small motor which dislikes the deflection which synchronized with rotation of shafts, such as a VTR drum spindle motor and a LBP spindle motor, in order to suppress the deflection of a bearing unit, between a shaft and an inner ring of spiral wound gasket, adhesion clearance is not given, but two bearing is pressed fit, and there are some which are putting in the spring between these bearing.

[0003]

[Problem(s) to be Solved by the Invention] In this kind of bearing unit, since there is a merit that moment rigidity is raised, it is desirable to take the large pitch (for it to also be called a span) of bearing. As a bearing configuration which obtains this merit, a narrow thing is desirable on the relation which enlarges the span of bearing. As this conventional kind of a bearing unit, the bearing unit shown in drawing 6 is mentioned as an example of representation, this unit opens spacing in the peripheral face of a revolving shaft 100 mutually, and fixes anti-friction bearing 200,200, the end faces 201a and 201a of the outer ring of spiral wound gasket 201,201 of bearing which face are equipped with the spring seat 300,300, coiled spring 400 is infixed in them through this spring seat 300,300, and precompression is given to them, for example. 500 are shielding currently fixed to the end faces 201a and 201a which face, and the end faces 201b and 201b of the opposite side among drawing, 600 shows a cage and the tooth back 601 of a cage 600 is located in a shielding 500 side. However, as for this conventional technique, broad type bearing is applied. That is, it was difficult to obtain the merit of a narrow bearing configuration not being applied but raising moment rigidity with such structure since it was difficult to surely narrow bearing width of face in order to avoid interference with shielding 500 and the tooth back 601 of a cage 600. In addition, although the type which eliminates the spring seat 300 and opens this inside can be considered, only by opening wide, a spring will enter in bearing, or it slides on an outer-ring-of-spiral-wound-gasket flat surface, and the fault of jumping out arises.

[0004] The place which this invention was made in view of such a trouble that the conventional technique has, and is made into the purpose is offering the bearing unit which has the seal plate combination spring seat which avoided the interference by the side of a cage tooth back, and aimed at improvement in moment rigidity.

[0005]

[Means for Solving the Problem] It fixed centering on two bearing, and in the unit which prepared the spring and has given precompression between these bearing, the spring seat was attached in bearing, and serves as the seal plate, and the technical means which this invention made in order to attain the above-mentioned technical problem are having established the interference recess by the side of a cage tooth back inside this spring seat.

[0006] The above-mentioned spring seat is good as what is prolonged in a radial inner-ring-of-spiral-wound-gasket side, and forms a labyrinth between the bore side of this spring seat, and an inner-ring-of-spiral-wound-gasket end face, a shaft or both sides.

[0007] Moreover, a spring seat may be formed with plastics and it is good also considering a spring as a disk spring.

[0008] Furthermore, the light pressure close and adhesion may be used together that a shaft and bearing insert each other in.

[0009]

[Embodiment of the Invention] Hereafter, 1 operation gestalt of this invention bearing unit is explained based on drawing. In addition, it does not pass in 1 operation gestalt of this invention bearing unit, a limited interpretation is

not carried out at all at this, and a design change is possible for this operation gestalt within the limits of this invention.

[0010] Two bearing by which one is fixed to a shaft among drawing and 2 and 2 are being fixed to this shaft 1, and 20 show the bearing 2 of these two individuals, and the spring currently arranged among two.

[0011] Bearing 2 has two or more rolling elements 10 incorporated between an outer ring of spiral wound gasket 3, an inner ring of spiral wound gasket 6, and this outer ring of spiral wound gasket 3 and an inner ring of spiral wound gasket 6, and the cage 11 to which it shows this rolling element 10, and it arranges the seal plate 19 in the side which un-counters while it arranges the spring seat 12 which served as the seal plate in the side which this bearing 2 and bearing 2 counter. The cage 11 is inserted so that the tooth-back 11a side may be located in the side which counters with the spring seat 12. That is, bearing 2 shall be equipped with the spring seat 12 which is what equipped with and opened the seal plate wide in one side (side which it is the opposite side of two bearing 2 and 2, and the tooth-back 11a side of a cage 11 counters), and served as the seal plate to the disconnection side. In addition, there is especially nothing of 19 seal plate with which the two un-countering side of bearing 2 and 2 is equipped by which a limited interpretation is carried out in the structure, and a noncontact seal and well-known non-contact shielding, or a well-known contact seal is suitably chosen within the limits of this invention.

[0012] Moreover, bearing 2 usually gives the press fit interference corresponding to an axial load between inner-ring-of-spiral-wound-gasket 6 bore and shaft 1 outer diameter, and is pressed fit so that it may insert each other in and the section may not shift, even if a big load is applied to shaft orientations or the axial load by impacts, such as fall, is applied. However, it is also possible to insert each other in and for the section to become a clearance, to use adhesives for instead of [which does not give a small interference to extent out of which the deflection by eccentricity does not come], in order to support an axial load, and to carry out press fit / adhesion immobilization of bearing and the shaft by concomitant use of few press fit interferences and adhesives.

[0013] In addition, in this invention, it is not limited to an illustration gestalt, but it replaces with an illustration gestalt, and, of course, an outer ring of spiral wound gasket 3, an inner ring of spiral wound gasket 6, and especially the rolling element 10 can adopt other gestalten suitably within the limits of this invention.

[0014] It forms the fitting flange 14 prolonged in shaft orientations in a part of the external surface 13, and the spring seat 12 is constituted, fits this flange 14 into an outer ring of spiral wound gasket 3, and the bearing 1 side (side which it is a disconnection side without the seal plate 19 of bearing, and cage tooth-back 11a counters) is equipped with it while it is formed in the shape of [of a major diameter] a circular ring rather than outer-ring-of-spiral-wound-gasket 3 bore at least. And this spring seat 12 serves as the seal plate by the side of cage tooth-back opposite (shielding), making an inside 17 a spring bearing side. Especially the quality of the material of the spring seat 12 is not limited, but although a design change is possible suitably within the limits of this inventions, such as a metal, synthetic resin, and rubber, if it shall consist of synthetic-resin material, it can attain low cost-ization.

[0015] The shaft-orientations positioning thrust reliance section 15 is formed in that external surface (bearing opposed face) 13, and when [this] it dashes, the section 15 is dashed against the request part (dashing field) of an outer ring of spiral wound gasket 3 and fitting immobilization of the spring seat 12 is carried out, the cage interference recess [****] 21 is formed in the above-mentioned spring seat 12 between this spring seat external surface 13 and the cage tooth-back 11a side. The external surface 13 of this spring seat 12 is the recess tooth space formed so that it may not interfere the cage tooth-back 11a side, and the cage interference recess 21 consists of request tooth spaces formed between the spring seat external surface 13 and the cage tooth-back 11a side, when the spring seat 12 is fixed to an outer ring of spiral wound gasket 3. For example, upper spring seat external surface 13a of ** fitting flange 14 is made into the shaft-orientations positioning thrust reliance section 15. When this thrust reliance section 15 shall be dashed against the outer-ring-of-spiral-wound-gasket flat surface (dashing field) 5, The cage interference recess 21 which brought near spring seat external surface 13b of fitting flange 14 lower part in the inside 17 direction rather than spring seat external surface 13a of the fitting flange 14 upper part, and had request distance between cage tooth-back 11a is formed (drawing 1 , 2, 3 reference).

** Make the shaft-orientations apical surface of the fitting flange 14 into the shaft-orientations positioning thrust reliance section 15. When this thrust reliance section 15 shall be dashed against wall surface 4a in the seal groove 4 of an outer ring of spiral wound gasket 3, Spring seat external surface 13b of fitting flange 14 lower part is dashed, it brings near in the inside 17 direction rather than the section 15, and the cage interference recess 21 which had request distance between spring seat external surface 13b of fitting flange 14 lower part and cage tooth-back 11a is formed (drawing 4 , 5 reference). In addition, when the shaft-orientations positioning thrust reliance section 15 is dashed against the request part of an outer ring of spiral wound gasket 3 and fitting immobilization of the spring seat 12 is carried out at an outer ring of spiral wound gasket 3, especially if outside 13 location of cage tooth-back 11a and the spring seat 12 which counters is the configuration of estranging with

the request distance of cage tooth-back 11a and extent in which it does not interfere, the limited interpretation of the cage interference recess 21 will not be carried out. Moreover, although the external surface 13 of the spring seat 12 which forms the cage interference recess 21 between cage tooth-back 11a is made into the shape of a straight in the direction of a path with this operation gestalt For example, you may be what prepares the circumferential groove (not shown) which carried out the concave bend, and forms the tooth space as cage interference recess in a shaft-orientations inside side in cage tooth-back 11a and the location which counters. Moreover, it is possible to adopt other configurations and to form the tooth space as cage interference recess in the bottom of the same main point. Moreover, when the external surface 13 of the spring seat 12 dashes the above-mentioned shaft-orientations positioning thrust reliance section 15 against the request part of an outer ring of spiral wound gasket 3, it is considered as the configuration which does not contact an inner ring of spiral wound gasket 6. The fitting flange 14 follows a circumferential direction, is prepared in the request part of external surface 13, or it can be prepared intermittently.

[0016] It is also within the limits of this invention for the spring seat 12 to extend that bore to a radial inner-ring-of-spiral-wound-gasket side, to form the labyrinth 8 of very narrow clearance between the external surface 13 of this spring seat bore approach and the inner-ring-of-spiral-wound-gasket flat surface 7, and to raise protection-against-dust nature. Moreover, it is also within the limits of this invention to extend that bore side to a radial inner-ring-of-spiral-wound-gasket side further, to form the labyrinth 9 of very narrow clearance between this spring seat bore edge 16 and axial outer-diameter 1a, and to raise the further protection-against-dust nature. Especially the labyrinth 8 formed between the external surface 13 of the above-mentioned spring seat bore approach and the inner-ring-of-spiral-wound-gasket flat surface 7, for example although not illustrated is possible also for considering as a complicated and narrow labyrinth path by forming either or the both sides of the external surface 13 of spring seat bore approach, and the inner-ring-of-spiral-wound-gasket flat surface 7 in cross-sectional-view concave convex (or wavelike), and is within the limits of this invention. Moreover, even if it is in the labyrinth 9 formed between the spring seat bore edge 16 and axial outer-diameter 1a similarly, it is also possible to consider as a complicated and narrow labyrinth path by forming either or the both sides of the spring seat bore edge 16 and axial outer-diameter 1a in cross-sectional-view concave convex (or wavelike).

[0017] The spring seat 12 is good for the direction of a path as with the shape of a straight in the inside (confrontation of the spring seat 12 and 12 comrades) 17 which a spring 20 touches, and it is also possible to consider as the configuration which forms the radial-locating step 18 of a spring 20 in the request part of this inside 17, and corrects the posture of a spring 20 and a location. Although especially a limited interpretation is not carried out, the radial-locating step 18 of a spring 20 For example, the type which extended the upper limit (outer diameter) of the spring seat inside 17 to shaft orientations, and made outer-diameter side 18a the positioning step 18 like ** drawing 1 , ** Like drawing 2 , the type which cut the arbitration part of the spring seat inside 17, and made outer-diameter side 18a and bore side 18b the positioning step 18 is mentioned as an example like the type which cut the upper limit (outer diameter) of the spring seat inside 17, and made bore side 18b the positioning step 18, and ** drawing 3 .

[0018] Although especially the spring 20 is not limited but uses the coil spring (a part is omitted on a drawing) with this operation gestalt, when between bearing 2 and 2 becomes narrow, it is replaced with this coil spring and is good also as a disk spring.

[0019] "The first operation gestalt" (drawing 1)

This operation gestalt carries out press fit immobilization of the two bearing 2 and 2 at outer-diameter 1a of a shaft 1, and this bearing 2 and 2 shows an example of the bearing unit which was equipped with the spring seats 12 and 12 which served as the seal plate, formed the coil spring 20 over this each of spring seat 12 and 12, and has given precompression to each side which faces. The spring seat 12 dashes the shaft-orientations positioning thrust reliance section 15 against the outer-ring-of-spiral-wound-gasket flat surface 5, and forms the tooth space which serves as the cage interference recess 21 between external surface 13 and cage tooth-back 11a while it fits into an outer ring of spiral wound gasket 3 the fitting flange 14 attached around the outer-diameter approach of external surface 13. Moreover, with this operation gestalt, while forming the very narrow labyrinth 8 between the external surface 13 of the bore approach of the spring seat 12, and the inner-ring-of-spiral-wound-gasket flat surface 7, the very narrow labyrinth 9 is formed between the bore edge 16 of this spring seat 12, and axial outer-diameter 1a. Moreover, the spring seat 12 extends inside upper limit (outer diameter) to shaft orientations, and is taken as the radial-locating step 18 of a spring 20. Therefore, the bearing 2 pressed fit in the shaft 1 and the spring 20 arranged among two are stabilized, is held by the spring seats 12 and 12, and it invades into bearing like before, or it does not have a possibility of jumping out to the method of outside, either. Moreover, since this spring seat 12 establishes the cage interference recess 21 which avoids interference with cage tooth-back 11a between cage tooth-back 11a and is arranged, If between two bearing 2 and 2 is narrow, it replaces with a seal plate and this spring seat 12 is allotted even if it is the case where seal plates are a cage and the